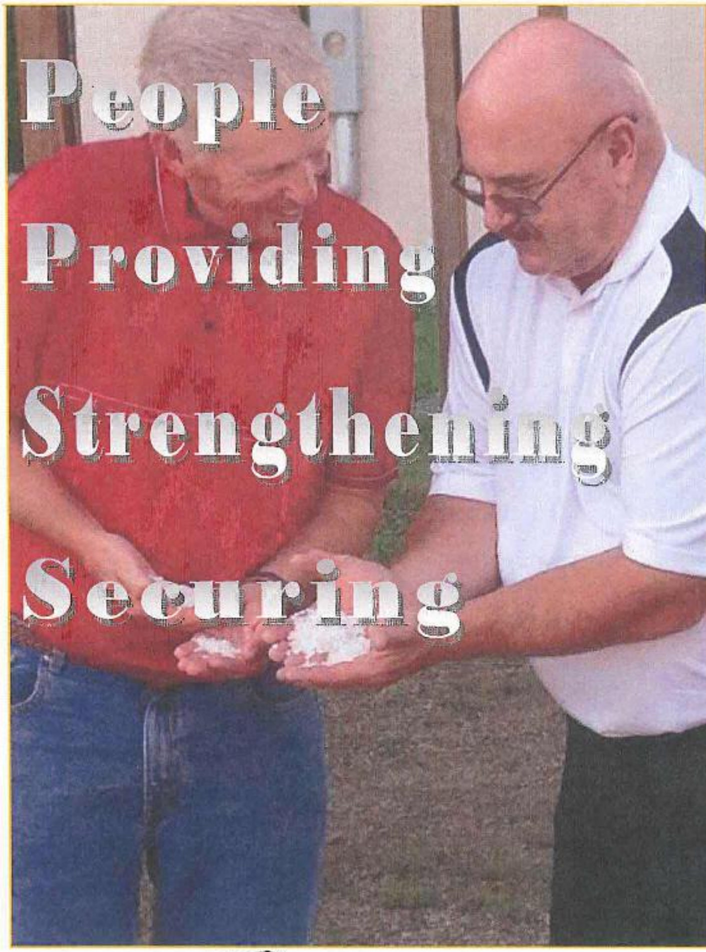

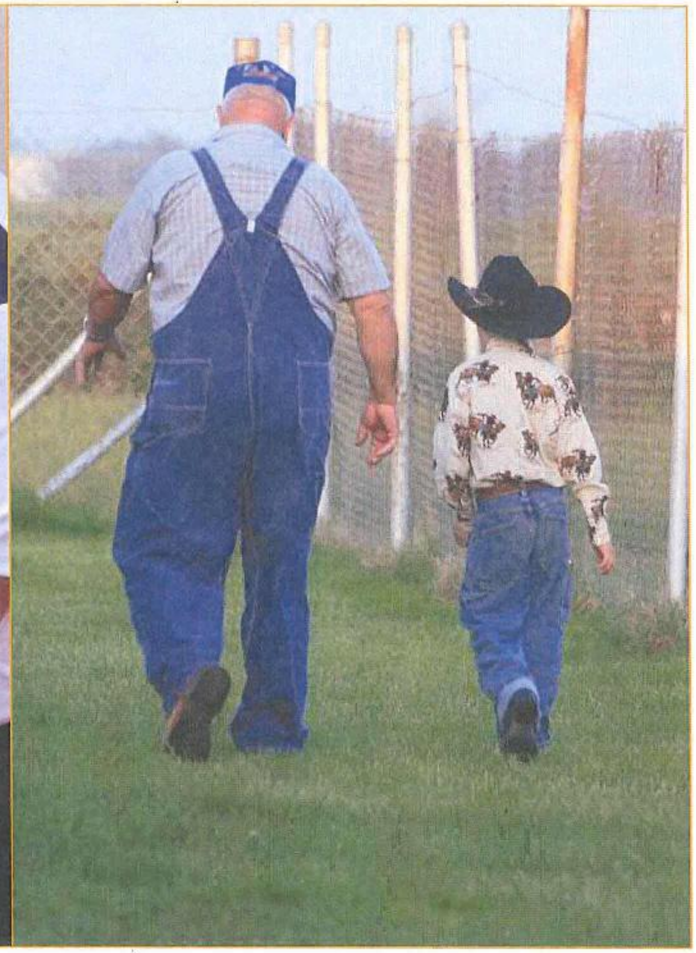

MICHIGAN POTASH OPERATING, LLC

OPERATOR RESPONSE TO EPA REGION V REQUEST FOR ADDITIONAL INFORMATION, CLASS I NON HAZARDOUS PERMIT APPLICATION NOS: MI-133-1I-0004,0005,0006

OCTOBER 2015

OPERATOR RESPONSE TO EPA REGION V REQUEST FOR ADDITIONAL INFORMATION, CLASS I NON HAZARDOUS PERMIT APPLICATION NOS: MI-133-1I-0004,0005,0006 OCTOBER 2015

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1. EPA REQUESTS AND RESPONSES;
   PARAGRAPH 1 of 1, Pressure & flow monitor range and calibration:

   1.1 Expalin why the gauge range is appropriate ot measure the estimated MIP, or select a gage range that is closer to the predicted MIP measurements. Once selected, provide the gage information that includes the accurancy/error of measurements made within the predicted operating span of the gage.
   1.2 MP must select a gage with a range that will accurately measure the annulus pressure within the operating pressure of the annulus. Once selected, provide the gage information that includes the accurancy/error of measurements made within the predicted operating span of the gage.
   1.3 Specify the type of flow meter, the meter range, units of measurement, and accurancy in the operating span.
   1.4 Clarify the configuration or location of pressure and flow gages/monitors with respect to the three injection wells.
   1.5 Submit information that outlines the number of gages/meters used and their relationship to the three injection wells.
   1.6 If a central computerized data processing unit is used, an explanation is needed as to how it will function and how it will be used to process monitoring data for reporting to EPA, if this is the case.
   1.7 Provide a description of the method used to monitor the pressure change in the injection zone. If a pressure fall off test is used, provide a brief description of the procedures of the test.

MICHIGAN POTASH OPERATING, LLC

October 12th, 2015

Mr. Allan Batka
Chief, UIC Branch (WU-16J)
US EPA Region 5
77 W. Jackson Blvd.
Chicago, IL 60604-3590

VIA: Priority Tracking, USPS

Re: CLASS I NON HAZARDOUS APPLICATION No. MI-133-1I-0004,0005,0006
OSCEOLA AND MECOSTA COUNTY, MICHIGAN
INFORMATION REQUEST (SEPTEMBER 2015)

Dear Mr. Batka:

In response to your Letter dated, September 17TH 2015, please find enclosed, respectfully submitted for your review, our first response to your inquiry concerning the above reference UIC application.

If you have any questions or require any additional information, please feel free to contact me directly at 970 590 3944.

Sincerely yours,

Theodore Pagano, P.E., P.G.
General Manager
Michigan Potash Operating, LLC
tpagano@mipotash.com

Michigan Potash Operating, LLC
Class 1 permit applications review follow-up
September 17, 2015

1. <u>Pressure & flow monitor range and calibration:</u>

   a. The permit application identifies the injection pressure gage range as 0-8700 psi. The application also estimates the maximum injection pressure (MIP) to be 2500 psi. The range of the gage far exceeds the range of measuring the MIP. Michigan Potash (MP) needs to explain why the gage range is appropriate to measure the estimated MIP. Or, select a gage range that is closer to the predicted MIP measurements. Once the range is established, information regarding the accuracy of the gage is needed. This should include the accuracy/error of measurements made within the predicted operating span of the gage. This information is usually available from the gage manufacturer.

   b. The permit application identifies the annulus pressure gage range as 0-2400 psi. The annulus pressure must be kept at a pressure higher than the MIP, usually but not always, 100 psi higher. The permit application estimates the MIP to be 2500 psi which will result in maintaining an annulus pressure higher than the annulus pressure gage can read. MP must select a gage with a range that will accurately measure the annulus pressure within the operating pressure of the annulus. Once selected, gage information must include the accuracy/error of measurements made within the predicted operating span of the gage. This information is usually available from the manufacturer.

   c. The permit application does not identify the type of flow meter(s) or how it functions, meter range, units of measurement, accuracy, and error within operating span. MP must submit this information to EPA.

   d. The permit application does not clarify the configuration or location of pressure and flow gages/monitors with respect to the three injection wells. MP must submit information that outlines the number of gages/meters used and their relationship to the three injection wells, (i.e., will there only be one set of gages/monitors for all three wells, will each well have its own dedicated set of gages/monitors, will there be some combination of shared and well dedicated gages/monitors ?). If a central computerized data processing unit is used, an explanation is needed as to how it will function and how it will be used to process monitoring data for reporting to EPA, if this is the case.

   e. The permit application identifies that the pressure build up in the injection zone will be monitored, but does not give any details. MP needs to provide a description of the method used to monitor the pressure change in the injection zone. If a pressure fall off test is used, MP needs to provide a brief description of the procedures of the test.

OPERATOR RESPONSE TO EPA REGION V REQUEST FOR ADDITIONAL INFORMATION, CLASS I NON HAZARDOUS PERMIT APPLICATION NOS: MI-133-11-0004,0005,0006 OCTOBER 2015

EPA request for Additional Information (September 17th 2015):

1. Pressure & flow monitor range and calibration:

   a. The permit application identifies the injection pressure gage range as 0-8700 psi. The application also estimates the maximum injection pressure (MIP) to be 2500 psi. The range of the gage far exceeds the range of measuring the MIP. Michigan Potash (MP) needs to explain why the gage range is appropriate to measure the estimated MIP. Or, select a gage range that is closer to the predicted MIP measurements. Once the range is established, information regarding the accuracy of the gage is needed. This should include the accuracy/error of measurements made within the predicted operating span of the gage. This information is usually available from the gage manufacturer.

1.1. Expalin why the gauge range is appropriate ot measure the estimated MIP, or select a gage range that is closer to the predicted MIP measurements. Once selected, provide the gage information that includes the accurancy/error of measurements made within the predicted operating span of the gage.

A Rosemont Model 2051T in-line digitial pressure transmitter, Range 4, will measure between 0 psi guage and 4000 psi guage, and will replace the proposed ABB Model 266HSH, V 0 -8700 PSI, so as to tighten the range of accuracy.

The manufacturer's specification, from Rosemont for the Model 2051T Range 4 is +/- 0.065% of span, or approximately +/- 2.6 psi.

The Manufacturers' specification for the selected device immediately follows for your direct reference.

Rosemount 2051T In-Line Pressure Transmitter

2051T In-Line
Wireless Pressure Transmitter

Configuration	Transmitter output code
4-20 mA HART 2051 2051 with Selectable HART[1]	A
Lower Power 2051 2051 with Selectable HART[1]	M
FOUNDATION fieldbus	F
PROFIBUS	W
Wireless	X

(1) The 4-20mA with Selectable HART device can be ordered with Transmitter Output option code A plus any of the following options codes: M4, QT, DZ, CR, CS, CT, HR5, HR7.

Additional information
Specifications: page 43
Certifications: page 53
Dimensional Drawings: page 61

Specification and selection of product materials, options, or components must be made by the purchaser of the equipment. See page 51 for more information on Material Selection..

Table 2. Rosemount 2051T In-Line Pressure Transmitter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Model	Transmitter type		
2051T	In-Line Pressure Transmitter		★
Pressure type			
G	Gage		★
A[1]	Absolute		★
Pressure range			
	2051TG	2051TA	★
1	-14.7 to 30 psi (-1.0 to 2.1 bar)	0 to 30 psi (0 to 2.1 bar)	★
2	-14.7 to 150 psi (-1.0 to 10.3 bar)	0 to 150 psi (0 to 10.3 bar)	★
3	-14.7 to 800 psi (-1.0 to 55 bar)	0 to 800 psi (0 to 55 bar)	★
4	-14.7 to 4000 psi (-1.0 to 276 bar)	0 to 4000 psi (0 to 276 bar)	★
5	-14.7 to 10000 psi (-1.0 to 689 bar)	0 to 10000 psi (0 to 689 bar)	★
Transmitter output			
A[2]	4–20 mA with Digital Signal Based on HART Protocol		★
F	FOUNDATION fieldbus Protocol		★

Specifications

Performance specifications

This product data sheet covers HART, Wireless, FOUNDATION fieldbus, and PROFIBUS PA protocols unless specified.

Conformance to specification [±3σ (Sigma)]

Technology leadership, advanced manufacturing techniques, and statistical process control ensure specification conformance to at least ±3σ.

Reference accuracy

Stated reference accuracy equations include terminal based linearity, hysteresis, and repeatability. For Wireless, FOUNDATION fieldbus, and PROFIBUS PA devices, use calibrated range in place of span.

Models		Standard	High performance option, P8	
2051C				
	Range 1	±0.10% of span For spans less than 15:1, accuracy = $\pm\left[0.025 + 0.005\left(\frac{URL}{Span}\right)\right]$% of Span	N/A	N/A
	Ranges 2-4	±0.065% of span For spans less than 10:1, accuracy = $\pm\left[0.025 + 0.005\left(\frac{URL}{Span}\right)\right]$% of Span	Ranges 2-4	High Accuracy Option, P8 ±0.05% of span For spans less than 10:1[1], accuracy = $\pm\left[0.015 + 0.005\left(\frac{URL}{Span}\right)\right]$% of Span
	Range 5	±0.075% of span For spans less than 10:1, accuracy= $\pm\left[0.025 + 0.005\left(\frac{URL}{Span}\right)\right]$% of Span	Range 5	High Performance Option, P8 ±0.065% of span For spans less than 10:1, accuracy= $\pm\left[0.015 + 0.005\left(\frac{URL}{Span}\right)\right]$% of Span
2051T	Ranges 1-4	±0.065% of span For spans less than 10:1, accuracy = $\pm\left[0.0075\left(\frac{URL}{Span}\right)\right]$% of Span	Ranges 1-4	High Accuracy Option, P8 ±0.05% of span For spans less than 10:1[1], accuracy = $\pm\left[0.0075\left(\frac{URL}{Span}\right)\right]$% of Span
	Range 5	±0.075% of span For spans less than 10:1, accuracy = $\pm\left[.0075\left(\frac{URL}{Span}\right)\right]$% of Span	N/A	N/A
2051L	Ranges 2-4	±0.075% of span For spans less than 10:1, accuracy = $\pm\left[0.025 + 0.005\left(\frac{URL}{Span}\right)\right]$% of Span	N/A	N/A

(1) For protocol cod F accuracy specification is for spans less than 7:1. Not available with output code W.

Functional specifications

Range and sensor limits

Table 7. Range and Sensor Limits

Range	2051CD, 2051CF, 2051CG, 2051L					
	Minimum span	Range and sensor limits				
		Upper (URL)	Lower (LRL)			
			2051C Differential 2051CF Flowmeters	2051C Gage(1)	2051L Differential	2051L Gage(1)
1	0.5 inH_2O (1.2 mbar)	25 inH_2O (62.3 mbar)	–25 inH_2O (–62.1 mbar)	–25 inH_2O (–62.1 mbar)	N/A	N/A
2	2.5 inH_2O (6.2 mbar)	250 inH_2O (0.62 bar)	–250 inH_2O (–0.62 bar)	–250 inH_2O (–0.62 bar)	–250 inH_2O (–0.62 bar)	–250 inH_2O (–0.62 bar)
3	10 inH_2O (24.9 mbar)	1000 inH_2O (2.49 bar)	-1000 inH_2O (-2.49 bar)	–393 inH_2O (–979 mbar)	–1000 inH_2O (–2.49 bar)	–393 inH_2O (–979 mbar)
4	3 psi (0.207 bar)	300 psi (20.7 bar)	-300 psi (-20,7 bar)	–14.2 psig (–979 mbar)	–300 psi (–20.7 bar)	–14.2 psig (–979 mbar)
5	20 psi (1.38 bar)	2000 psi (137.9 bar)	-2000 psi (-137.9 bar)	–14.2 psig (–979 mbar)	N/A	N/A

(1) Assumes atmospheric pressure of 14.7 psig.

Table 8. Range and Sensor Limits

Range	2051T			
	Minimum span	Range and sensor limits		
		Upper (URL)	Lower (LRL) (Abs)	Lower(1) (LRL) (Gage)
1	0.3 psi (20.7 mbar)	30 psi (2.07 bar)	0 psia (0 bar)	–14.7 psig (–1.01 bar)
2	1.5 psi (0.103 bar)	150 psi (10.3 bar)	0 psia (0 bar)	–14.7 psig (–1.01 bar)
3	8 psi (0.55 bar)	800 psi (55.2 bar)	0 psia (0 bar)	–14.7 psig (–1.01 bar)
4	40 psi (2.76 bar)	4000 psi (275.8 bar)	0 psia (0 bar)	–14.7 psig (–1.01 bar)
5	2,000 psi (137.9 bar)	10,000 psi (689.5 bar)	0 psia (0 bar)	–14.7 psig (–1.01 bar)

(1) Assumes atmospheric pressure of 14.7 psig.

Service

Liquid, gas, and vapor applications

Protocols

4–20 mA HART (Output Code A)

Power supply

External power supply required. Standard transmitter operates on 10.5 to 42.4 Vdc with no load.

EPA request for Additional Information (September 17th 2015):

1. Pressure & flow monitor range and calibration:

   b. The permit application identifies the annulus pressure gage range as 0-2400 psi. The annulus pressure must be kept at a pressure higher than the MIP, usually but not always, 100 psi higher. The permit application estimates the MIP to be 2500 psi which will result in maintaining an annulus pressure higher than the annulus pressure gage can read. MP must select a gage with a range that will accurately measure the annulus pressure within the operating pressure of the annulus. Once selected, gage information must include the accuracy/error of measurements made within the predicted operating span of the gage. This information is usually available from the manufacturer.

1.2. MP must select a gage with a range that will accurately measure the annulus pressure within the operating pressure of the annulus. Once selected, provide the gage information that includes the accurancy/error of measurements made within the predicted operating span of the gage.

A Rosemont Model 2051T in-line digitial pressure transmitter, Range 4, will measure between 0 psi guage and 4000 psi guage, and will replace the proposed ABB Model 266HSH, Q 0 -2400 PSI, so as reflect an operating range that enables a measurement that is 100 psi over the maximum injection pressure.

The manufacturer's specification, from Rosemont for the Model 2051T Range 4 is +/- 0.065% of span, or approximately +/- 2.6 psi.

The Manufacturers' specification for the selected has been provided in Section 1.1.

EPA request for Additional Information (September 17th 2015):

1. Pressure & flow monitor range and calibration:

    c. The permit application does not identify the type of flow meter(s) or how it functions, meter range, units of measurement, accuracy, and error within operating span. MP must submit this information to EPA.

1.3. Specify the type of flow meter, the meter range, units of measurement, and accurancy in the operating span.

The FS4000 is a swirl type flow meter, delivering data via digitial output. The typical meter span is 1:25; and therefore on a 4" line will measure between +/- 25 gpm and +/- 660 gpm, with a range of error of one half percent (+/- 0.50 %). This selection of flowtype measurement is one of the highest accurancy available.

The Manufacturers' specification for the selected device immediately follows for your direct reference.

Data Sheet D184S035U02 Rev. 12

FV4000, FS4000
Vortex Flowmeter / Swirl Flowmeter

2-wire Compact Design
Digital Signal Processor
Converter Technology

For metering liquids, gases and steam

FV4000 Vortex flowmeter

FS4000 Swirl flowmeter for very short steadying zones

Approvals for explosion protection
- ATEX
- IEC
- $_{c}FM_{us}$
  Zone 1, Zone 2, dust ignition protection

Magnetic pen operation
- Configuration also possible with closed housing

Integrated switching output
- Used as limit contact or pulse output

Compensation of temperature influences by means of temperature measurement integrated as an option

Power and productivity
for a better world™

3.5 Reference conditions for flow measurement

	FV4000-VT4/VR4	FS4000-ST4/SR4
Set flow range	0.5 ... 1 x QvmaxDN	
Ambient temperature	20 °C (68 °F) ± 2K	
Humidity	65 % rel. humidity ± 5 %	
Air pressure	86 ... 106 kPa	
Supply power	24 V DC	
Signal cable length	10 m (32.8 ft) (FV4000-VR or FS4000-SR only)	
Current output load	250 Ω (4 ... 20 mA only)	
Fluid for calibration	Water: approx. 20 °C (68 °F), 2 bar (29 psi)	
Calibration loop internal diameter	= internal diameter of meter	
Unobstructed straight upstream section	15 x DN	3 x DN
Downstream section	5 x DN	1 x DN
Pressure measurement	3 ... 5 x DN downstream of meter	
Temperature measurement	2 ... 3 x DN downstream after pressure measurement	

3.6 FV4000-VT4 / VR4 flowrates

3.6.1 Fluid flowrates

DN		DIN pipe			ANSI pipe			
		Re min	$Q_v$maxDN (m³/h)	Frequency (Hz) at $Q_v$max	Re min	$Q_v$maxDN (m³/h)	$Q_v$maxDN (US gal/min)	Frequency (Hz) at $Q_v$max
15	1/2"	10000	6	370	11000	5,5	24	450
25	1"	20000	18	240	23000	18	79	400
40	1 1/2"	20000	48	270	23000	48	211	270
50	2"	20000	70	180	22000	66	291	176
80	3"	43000	170	140	48000	160	704	128
100	4"	33000	270	100	44000	216	951	75
150	6"	67000	630	50	80000	530	2334	50
200	8"	120000	1100	45	128000	935	4117	40
250	10"	96000	1700	29	115000	1445	6362	36
300	12"	155000	2400	26	157000	2040	8982	23

The flowrates apply for fluids at 20 °C (68 °F), 1,013 mbar (14.69 psi), = 998 kg/m³ (62.30 lb/ft³).

3.6.2 Gas / Steam flowrates

DN		DIN pipe			ANSI pipe			
		Re min	$Q_v$maxDN (m³/h)	Frequency (Hz) at $Q_v$max	Re min	$Q_v$maxDN (m³/h)	$Q_v$maxDN (ft³/min)	Frequency (Hz) at $Q_v$max
15	1/2"	10000	24	1520	11000	22	13	1980
25	1"	20000	150	2040	23000	82	48	1850
40	1 1/2"	20000	390	2120	23000	340	200	1370
50	2"	20000	500	1200	22000	450	265	1180
80	3"	43000	1200	1000	48000	950	559	780
100	4"	33000	1900	700	44000	1800	1059	635
150	6"	67000	4500	480	80000	4050	2384	405
200	8"	120000	8000	285	128000	6800	4002	240
250	10"	96000	14000	260	115000	12000	7063	225
300	12"	155000	20000	217	157000	17000	10006	195

The flowrates apply for gas at = 1.2 kg/m³ (0.075 lb/ft³).

3 General specifications

3.1 Nominal diameter selection

The nominal diameter is selected on the basis of the maximum operating flow Qv max. If maximum spans are to be achieved, this should not be less than half the maximum flowrate for each nominal diameter (Qv max DN), although reduction to approx. 0.15 Qv max DN is possible. The linear lower range limit value is dependent upon the Reynolds number (see accuracy information).

If the flow to be measured is the standard flow (standard condition: 0 °C (32 °F), 1,013 mbar) or mass flowrate, this must be converted to the operating flow and the most appropriate nominal device diameter must be selected from the flow range tables (Tables 1, 2, 3).

= Operating density (kg/m³)
N = Standard density (kg/m³)
P = Operating pressure (bar)
T = Operating temperature (°C)
Qv = Operating flow (m³/h)
Qn = Standard flow (m³/h)
Qm = Mass flowrate (kg/h)
= Dynamic viscosity (Pas)
= Kinematic viscosity (m²/s)

1. Conversion of standard density (n) --> operating density ( )

$$\rho = \rho_n \times \frac{1{,}013 + p}{1{,}013} \times \frac{273}{273 + T}$$

2. Conversion to operating flow (Qv)

a) From standard flow (Qn) -->

$$Q_V = Q_n \frac{\rho_n}{\rho} = Q_n \frac{1{,}013}{1{,}013 + p} \times \frac{273 + T}{273}$$

b) From mass flowrate (Qm) -->

$$Q_V = \frac{Q_m}{\rho}$$

3. Dynamic viscosity ( ) --> kinematic viscosity ( )

$$\nu = \frac{\eta}{\rho}$$

Calculating the Reynolds number:

$$Re = \frac{Q}{(2827 \cdot \nu \cdot d)}$$

Q = Flow in m³/h
d = Pipe diameter in m
= Kinematic viscosity m²/s (1 cst = 10^{-6} m²/s)

The current Reynolds number can also be calculated using our AP-Calc calculation program.

3.2 Measured value deviation for flow measurement

Deviation in percentage terms from the measured value under reference conditions (including the transmitter) in the linear measuring range between Re min and Qmax (see "Measuring ranges" table).

	FV4000-VT4/VR4	FS4000-ST4/SR4
Fluids	≤ ± 0,75 %	± 0,5 %
Gases / Steam	≤ ± 1 %	
Current output		
Additional measurement uncertainty	< 0,1 %	
Temperature effect	< 0,05 % / 10 K	

Misalignment associated with installation or deinstallation may affect the measuring error.

Additional measuring errors may occur if there are deviations from the reference conditions.

3.2.1 Reproducibility as a percentage of the measured value

DN	Inch	FV4000-VT4/VR4	FS4000-ST4/SR4
15	1/2"	0,3 %	
25 ... 250	1" ... 6"	0,2 %	
200 ... 300	8" ... 12"	0,25 %	0,2 %

3.3 Measured value deviation for temperature

Measured value deviation (including transmitter)

± 2 °C

Reproducibility

≤ 0.2 % of measured value

Product selection and dimensioning program

Important

The ABB "AP-Calc" program can be used free of charge when selecting an appropriate flowmeter for a given application. The program runs in a Microsoft WINDOWS ® environment.

3.4 Permissible pipeline vibrations

Guide values: The values specified for acceleration g are intended as guide values. The actual limits will depend on the nominal diameter, the measuring range within the entire measuring span, and the frequency of the vibrations. Therefore, the acceleration value g has only limited meaning.

FV4000:

Fluid: max. 1.0 g, 0 ... 130 Hz

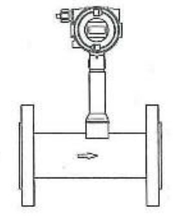
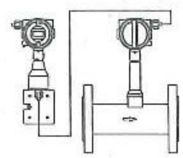
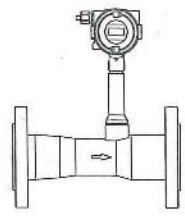
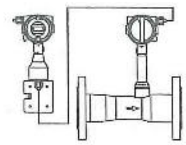
Gas / steam: max. 0.3 g, 0 ... 130 Hz

FS4000:

Fluid: max. 0.3 g, 0 ... 130 Hz

Gas / steam: max. 0.3 g, 0 ... 130 Hz

2 Overview of flowmeters

		FV4000-VT4 (TRIO-WIRL VT)	FV4000-VR4 (TRIO-WIRL VR)	FS4000-ST4 (TRIO-WIRL ST)	FS4000-SR4 (TRIO-WIRL SR)
		 G00740	 G00742	 G00741	 G00743
Measured value error	Fluids	≤ ± 0.75 % of flow rate under reference conditions		≤ ± 0.5 % of flow rate under reference conditions	
	Gases and steam	≤ ± 1 % of flow rate under reference conditions			
Reproducibility		DN 15 ≤ ± 0.3 % of flow rate		DN 15 ≤ ± 0.3 % of flow rate DN 20 or higher ≤ ± 0.2 of flow rate	
		DN 15 to DN 150 ≤ ± 0.2 of flow rate			
		DN 200 or higher ≤ ± 0.25 % of flow rate			
Permissible viscosity for fluids (> 7.5 mPa s, field calibration required for FS4000)		DN 15 ≤ 4 mPa s		DN 15 to DN 32 ≤ 5 mPa s	
		DN 25 ≤ 5 mPa s		DN 40 to DN 50 ≤ 10 mPa s	
		DN 40 or higher ≤ 7.5 mPa s		DN 80 or higher ≤ 30 mPa s	
Typical span		1:20		1:25	
Typical inflow / outflow sections		15 x DN / 5 x DN		3 x DN / 1 x DN	

Sensor

Process connection (DIN, ANSI. JIS)	Flange	DN 15 to DN 300 (1/2" to 12")		DN 15 to DN 400 (1/2" to 16")	
	Wafer flange	DN 15 to DN 150 (1/2" to 6")		-	
Sensor design	Single sensor	Yes, optional with integrated temperature measurement (DN 50 or higher)			
	Double sensor				
Fluid temperature	Standard	-55 ... 280 °C (-67 ... 536 °F)		-55 ... 280 °C (-67 ... 536 °F)	
	High temperature (DN 25 or higher)	-55 ... 400 °C (-67 ... 752 °F)		-	
Ingress protection		IP 65 / IP 67 / Nema 4X			
Materials	Sensor	Stainless steel opt. Hast. C / Titan		Stainless steel opt. Hast. C / Titan	
	Inlet / outlet pipe	-		Stainless steel opt. Hast. C	
	Solid body	Stainless steel opt. Hast. C		-	
	Meter housing	Stainless steel opt. Hast. C		Stainless steel opt. Hast. C	
	Sensor gasket	Graphite, Kalrez, Viton, PTFE		Graphite, Kalrez, Viton, PTFE	
Only FVR4000 or FSR4000	Signal cable length between sensor and transmitter	-	max. 10 m (32.8 ft)	-	max. 10 m (32.8 ft)

Transmitter

Supply power	For analog output 4 ... 20 mA	14 ... 46 V (Ex ib ≤ 28 V)
	For PROFIBUS PA and FOUNDATION fieldbus	I < 10 mA (9 ... 32 V; Ex ia ≤ 24 V)
Sealing concept		Dual sealing acc. to ANSI / ISA-12.27.01 (VT43/VR43/ST43/SR43)
Display	2 x 8-digit /2 x 16-digit	Local display / totalization with magnetic pen operation / Parameters via HART protocol / PROFIBUS PA / FOUNDATION fieldbus adjustable
External FRAM		Yes, for saving transmitter parameterization data as well as flowmeter sensor calibration data
Contact output	(Optocoupler for standard) NAMUR contact (Ex ia / ib)	Can be parameterized as limit contact (flow, temperature), alarm output or pulse output
Saturated steam calculation / Temperature compensation		Yes, if sensor is fitted with temperature measurement device
Communication		HART protocol, PROFIBUS PA (Profile 3.0), FOUNDATION fieldbus

EPA request for Additional Information (September 17th 2015):

1. Pressure & flow monitor range and calibration:

   d. The permit application does not clarify the configuration or location of pressure and flow gages/monitors with respect to the three injection wells. MP must submit information that outlines the number of gages/meters used and their relationship to the three injection wells, (i.e., will there only be one set of gages/monitors for all three wells, will each well have its own dedicated set of gages/monitors, will there be some combination of shared and well dedicated gages/monitors ?). If a central computerized data processing unit is used, an explanation is needed as to how it will function and how it will be used to process monitoring data for reporting to EPA, if this is the case.

1.4. Clarify the configuration or location of pressure and flow gages/monitors with respect to the three injection wells.

FIGURE K1 (below) is a graphical illustration of the proposed injection facility (Source Attachement K, Injection Procedures), with particular emphasis on the location of each gage and meter used and their relationship to the injection well location.

Injection pressure will be monitored via digital measurement, at both the pump house and at the wellhead via duplicitous digital measurement via Rosemont 2051T (See Section 1.1) FOR EACH WELL. This will facilitate the immediate identification of instrument error.

Annulus pressure will be monitored via digitial measurement, at the wellhead location via Rosemont 2051T (See Section 1.2) FOR EACH WELL.

Flow Rate will be monitored via digitial measurement, at the pumphouse FOR EACH WELL.

There will be no shared pressure or flowrate monitoring for the wells.

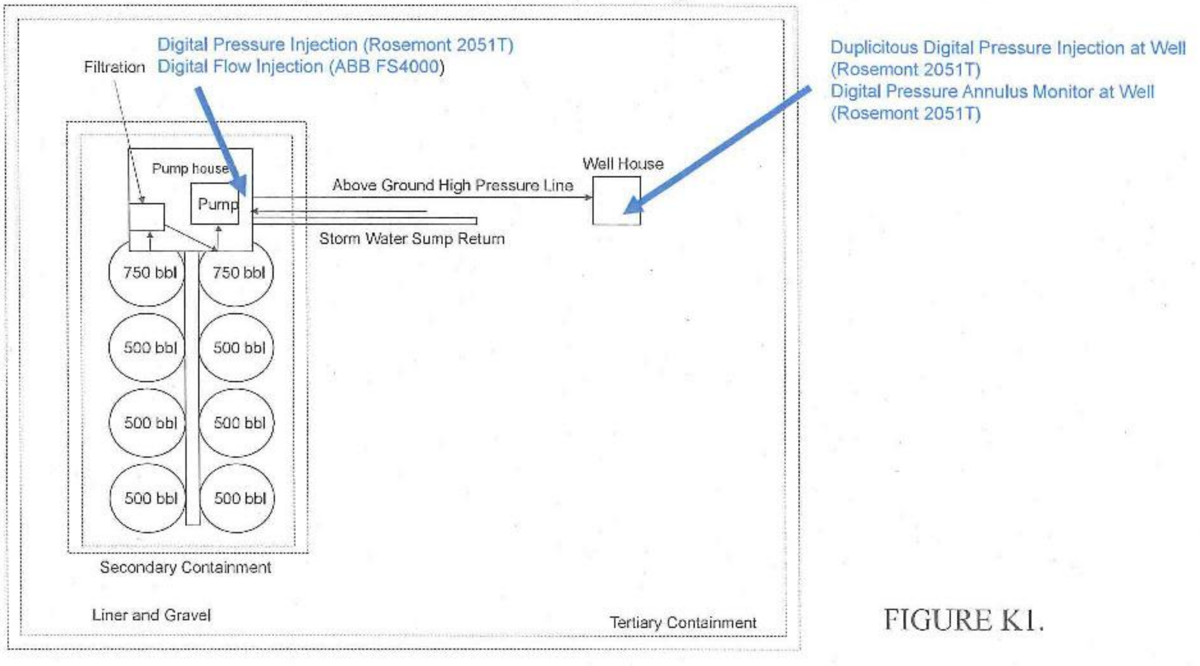


FIGURE K1.

1.4 CONTINUED. Clarify the configuration or location of pressure and flow gages/monitors with respect to the three injection wells.

FIGURE M4 (below) is a graphical illustration of the proposed wellhead construction (Source Attachement M, Construction Details), with particular emphasis on the location of each gage and meter used and their relationship to the injection well location. Each wellhead is located in the Well House, as illustrated on Figure K1. Each well has its own independent wellhead and independent digitial pressure monitoring equipment.

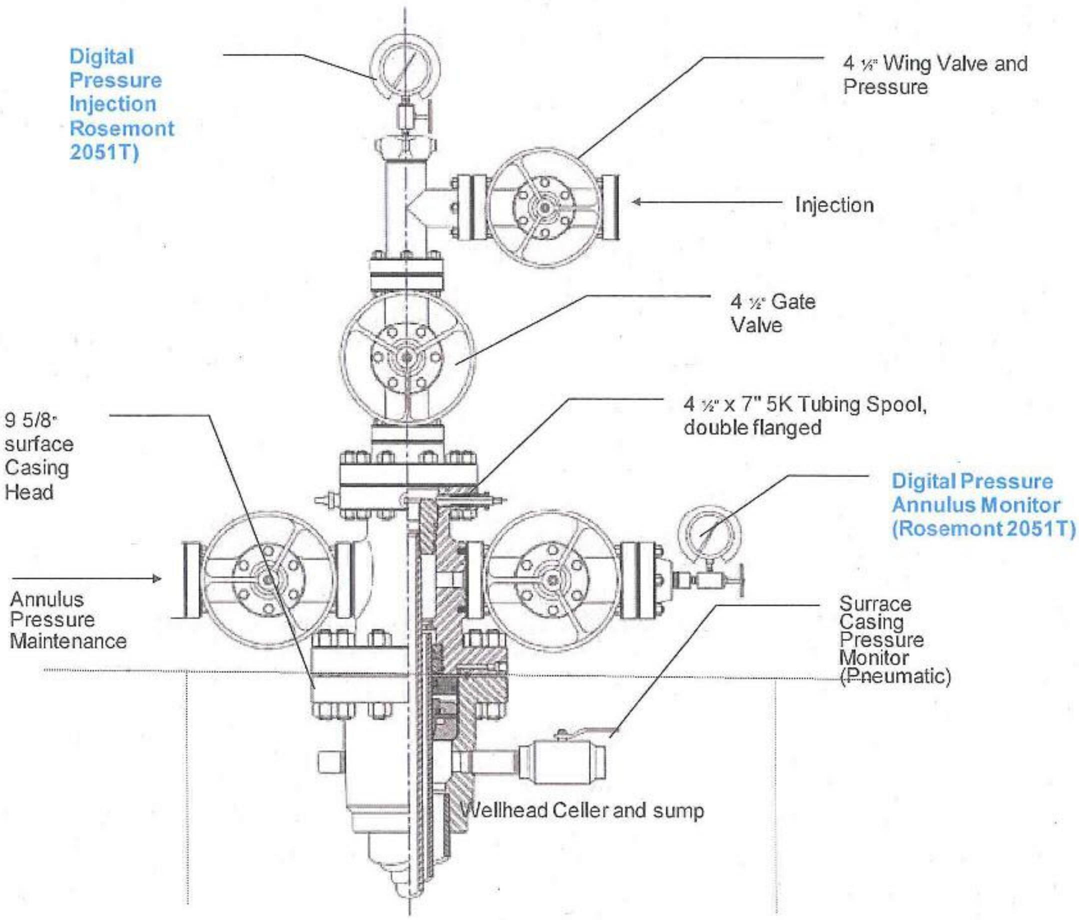


FIGURE M4.

1.5 Submit information that outlines the number of gages/meters used and their relationship to the three injection wells.

There shall be no shared pressure and flow rate monitoring of the three wells. Each well is operated independently with different injection pumps. The table below summarizes the gages/meters and their relationship to the three injection wells. Pneumatic pressure gauges are included, which will allow a daily manual verification of digitial montiroing, both at the pumphouse and at the wellhead. This is a total of 3 digitial pressure monitors, 4 pneumatic pressure gauges, and 1 digital flow meter per well.

At *PUMP HOUSE*	Description	Digital Flow Rate	Digital Injection Pressure	Pneumatic Pressure Guage
MPC 1D	Injection Pressure and Flow Rate off of Pump for MPC 1D	1	1	1
MPC 2D	Injection Pressure and Flow Rate off of Pump for MPC 2D	1	1	1
MPC 3D	Inejection Pressure and Flow Rate off of Pump for MPC 3D	1	1	1
At WELLHEAD	**Description**	**Digital Flow Rate**	**Injection & Annulus Pressure**	**Pneumatic Pressure Injection & Annulus & Surface**
MPC 1D	Injection Pressure and Annulus Pressure at Wellhead	-	2	3
MPC 2D	Injection Pressure and Annulus Pressure at Wellhead	-	2	3
MPC 3D	Injection Pressure and Annulus Pressure at Wellhead	-	2	3

1.6 If a central computerized data processing unit is used, an explanation is needed as to how it will function and how it will be used to process monitoring data for reporting to EPA, if this is the case.

While a central computerized data processing unit is not anticipated at this time, a PLC system will be utilized for the cataloguing of digitial data from the continuous recording devices as per section P2 (Monitoring Program), "Injection flow rate, injection pressure, cumulative brine volume, and tubing-casing annulus pressure are monitored with continuous recording devices. In addition, pneumatic and traditional gauges and back-up electronic gauges will be installed at the pump house. Each will be recorded via a PLC recording system and human interface system."

A program logic control ("PLC") device is a recording device, programmed in a computer language capable of storing data and doing simple logic. The PLC will store its data in a battery-backed-up RAM or some other non-volatile flash memory that can be immediately downloaded and reported to the EPA or State

1.6 CONTINUED If a central computerized data processing unit is used, an explanation is needed as to how it will function and how it will be used to process monitoring data for reporting to EPA, if this is the case.

regulatory authorities at any time, via direct or network interface. Through a network interface, the PLC can communicate with a personal computer, where the computer can serve as a back-up data storage system, pulling data for all data inputs (pressure, flow-rate), at any specified interval. A 0:30 minute poll will be made for each input, for the operating life of the wells. Such a system serves as a comprehensive audit and trending tool to monitor the reservoir behavior and efficiency of the injection program.

EPA request for Additional Information (September 17th 2015):

1. Pressure & flow monitor range and calibration:

   e. The permit application identifies that the pressure build up in the injection zone will be monitored, but does not give any details. MP needs to provide a description of the method used to monitor the pressure change in the injection zone. If a pressure fall off test is used, MP needs to provide a brief description of the procedures of the test.

1.7 Provide a description of the method used to monitor the pressure change in the injection zone. If a pressure fall off test is used, provide a brief description of the procedures of the test.

As per Section I6, a pressure fall off test will be performed at least once a year, throughout the life of the injection well to meet the requirements of 40 CFR 146.13. Pressure fall-off testing will be performed to monitor the pressure change in the injection zone as a result of injected volumes. A pressure falloff test has a period of injection followed by a period of no-injection or shut-in. A step up test and step down test will accompany the pressure fall off test for additional friction and near wellbore damage data.

1. A steady injection rate will be established, using regular brine captured for regular injection.
2. Determine injection brine density for test.
3. Ensure digital pressure and flow rate guage functionality and calibration before test.
4. Ensure consistant prior injection before test, minimum of 7 days.
5. Establish a pump in rate in alignment with normal operating rates, as observed during the prior 3 month operating period (i.e. average injection rate over the prior 3 month operating period).
6. Step injection rate up incrementally while allowing pressure to stabalize, as per the following (but not to exceed the average injection rate over the prior 3 month operating period (1 bpm = 42 gpm):
   a. 0.25 bpm, once pressure is stable, then to
   b. 0.50 bpm, once pressure is stable, then to
   c. 1.0 bpm, once pressure is stable, then to
   d. 2.0 bpm, once pressure is stable, then to
   e. 3.0 bpm, once pressure is stable, then to
   f. 4.0 bpm, once pressure is stable, then to
   g. 5.0 bpm, hold till pressure is stable
7. Perform step down test, to 1.0 bpm, reversing the rates as above.
8. Shut down injection.
9. Watch pressure leak off, recording continuously, but making note of
   a. Initial Shut In Pressure
   b. 5 minute shut in Pressure
   c. 10 minute shut in Pressure
   d. 15 minute shut in Pressure
   e. 30 minute shut in Pressure
   f. 60 minute shut in Pressure
   g. 90 minute shut in Pressure.
10. Monitor change in pressure vs. change in time slope (pressure/time derivative); increasing shut in time if necessary to observe a derivative close to zero.
11. Report data for transient analysis.